PRESSURE-SENSITIVE ADHESIVE COMPOSITIONS

FIELD OF THE INVENTION

This invention relates to novel pressure-sensitive adhesive compositions, and more particularly to hot-melt or high solid solvent-type pressure-sensitive adhesive compositions containing a specific type of stabilized rosin ester as a tackifying resin.

BACKGROUND ART

Common pressure-sensitive adhesives heretofore known include those comprising a rubber-type high-molecular-weight substance as a base polymer, tackifying resin, plasticizer and when required, stabilizer, antioxidant, filler, coloring agent and the like. These pressure-sensitive adhesives are applied in the form of a solution or emulsion or in a molten state to a substrate of cellophane, paper, cloth, plastics film, metal foil or the like, and dried to produce an adhesive tape, adhesive sheet or adhesive label. Generally natural rubber, styrene-butadiene rubber, acrylic resin and the like have been used as the rubber-type high-molecular-weight substance in the foregoing solvent-type pressure-sensitive adhesive. However, in light of environmental protection, saving of resources, increase of productivity, etc., recently hot-melt or high solid (solvent-type but high in solids content) pressure-sensitive adhesives containing the so-called block rubber as a base polymer have been increasingly used in place of the solvent-type pressure sensitive adhesives incorporating the rubber-type high molecular-weight substance. These resource-saving pressure sensitive adhesives such as hot-melt type, etc. generally contain a block rubber, tackifying resin and plasticizer (mainly oil) as major components in a weight ratio of 100:70–150:20–30. However, these pressure sensitive adhesives are yet unsatisfactory in cold resistance (tack at low temperatures), preparation of compounds, handle-ability during application and economy as compared with conventional solvent-type pressure sensitive adhesives containing a natural rubber or the like as a base material. Studies are under way to overcome these problems and particularly to improve the cold resistance by using an increased amount of the plasticizer component. More specifically, if the amount of the plasticizer component generally used in the above ratio relative to the block rubber is increased to about 50 to about 100 by weight, the pressure-sensitive adhesive is given a higher degree of cold resistance. On the other hand, the increase of the plasticizer amount to such level causes other drawbacks that packaging tapes are imparted a lower adhesive property (adhesion to corrugated boards) and that labels are made unfit for use because the plasticizer penetrates the surface of labels. Presumably these drawbacks are all caused mainly by the transfer of plasticizer. Accordingly, it is desired in industries to develop a novel tackifying resin which can overcome the drawbacks without the transfer of plasticizer.

We conducted extensive research to eliminate the foregoing drawbacks of hot-melt or high solid pressure-sensitive adhesives and particularly to explore tackifying resins to be used for the adhesives. Generally tackifying resins for pressure-sensitive adhesives must fulfil the following major requirements for properties; (1) to be outstanding in three adhesive characteristics (tack, adhesion and cohesion) in a normal state, (2) to keep the plasticizer from bleeding (to give packaging adhesives a high adhesion to corrugated boards and to provide lables with the surface free from the bleeding of plasticizer), (3) to exhibit high aging resistance and good thermostability. Among the tackifying resins heretofore used are terpene resin, aliphatic petroleum resin, hydrogenated petroleum resin, disproportionated rosin ester and the like. It has been found that these resins are insufficient to fulfil the foregoing requirements and remain to be improved in respect of the aforesaid problems and especially cold resistance. When tested in use for adhesives, aliphatic petroleum resin (usually having a softening point of about 100° C.) was found to allow the transfer of plasticizer in the adhesive, reduction in adhesion to corrugated boards and bleeding of plasticizer into the surface of labels. Further, resins of high softening points such as terpene resin (generally having a softening point of about 115° C.), hydrogenated petroleum resin (having a softening point of about 125° C.), fumarized rosin ester (having a softening point of about 125° C.) and the like were checked for properties. As a result, the terpene resin was found low in aging resistance, thermostability and adhesion to corrugated boards, and the hydrogenated petroleum resin was discovered to lead to the transfer of plasticizer although high in aging resistance and thermostability, hence undesirable. Thus we were unable to find that there invariably exists correlation between the softening point of the resin used and the transfer of plasticizer. With a high polarity, the fumarized rosin ester was expected to be free of the transfer of plasticizer, but was found unsatisfactory in any of the properties stated above in (1) to (3). The disproportionated rosin ester was insufficient in respect of the transfer of plasticizer although excellent in aging resistance and thermostability.

The results of our research described above show that the causal relation between the foregoing drawbacks and the kinds of the resin used is not clear since it is thought that the sofening point and polarity of the resin, the number of the functional groups of the resin, etc. are complicatedly related to one another. Accordingly, it was unpredictable what tacki flying resin can be effectively used to improve the properties of hotmelt or like pressure-sensitive adhesives containing a block rubber. However, based on the results thus obtained, we continued the research efforts, preparing various kinds of resins and unexpectedly found that the disproportionated rosin ester partially fumarized or maleinized is useful and the use thereof can eliminate the foregoing problems in respect of cold resistance, transfer of plasticizer, etc. The present invention has been accomplished based on this novel finding.

DISCLOUSE OF THE INVENTION

This invention provides a pressure-sensitive adhesive composition containing a block rubber, a tackifying resin and a plasticizer as major components, the composition being characterized in that the tackifying resin is partially fumarized and/or partially maleinized, disproportionated rosin ester (hereinafter referred to as "stabilized rosin ester").

The pressure-sensitive adhesive compositions of the present invention essentially contain a block rubber to impart a suitable coating ability and melt viscosity to the composition. The block rubbers which can be used in the present invention are not limited to particular kinds, and those conventionally used are usable as they